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ORIGINAL ARTICLE

Comparing the Effect of Stretching and Muscle Energy Technique in the Management of Lower Cross Syndrome

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ABSTRACT

Aim: To compare the effects of stretching exercises & muscle energy techniques in the management of lower cross syndrome.
Methods: In this parallel, randomized controlled trail fifty-eight patients were randomly assigned into two intervention groups. Group A received stretching technique and Group B received muscle energy technique, three sessions per week for total duration of four weeks.
Results: Normality test applied and P values were noted by applying Shapiro-Wilk test both groups. Baseline measures for both groups showed no significant difference as the P value > 0.05. The paired t-test within the group of Stretching and Muscle Energy Technique showed significant difference in pre and post Numeric Pain Rating Scale (NPRS), pre and post Oswestry Disability Index (ODI) and pre and post muscle length via inclinometer and goniometer. Independent t-test for post treatment groups between stretching group and muscle energy technique group was not significant i.e. P> 0.05.
Conclusion: The study concluded that statistically there is no significant difference in variables of both groups i.e. Numeric Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), bilateral muscle length of iliopsoas, hamstrings and rectus femoris as well as of erector spinae. However, mean values of above mentioned parameters show a little more improvement in Muscle Energy Technique group.
Keywords: Stretching, Muscle Energy Technique, Lower Cross Syndrome, Muscle imbalance.

INTRODUCTION

Postural misalignment is poor posture and as a result it develops lower Crossed Syndrome[1]. The condition in which lower back characterized by tight hip flexors muscles and lumbar back muscle and gluteus maximus weak around the pelvis and make S shaped posture of the lower back.. Deviation is seen due to increased lordosis and slight change in Centre of gravity which lead to change in pelvis alignment[2]. Poor posture is commonly seen in daily life situation[3] which develop many health risks including low back pain and musculoskeletal problems commonly[4]. Spinal misalignment impact on muscle strength , ranges caused localized muscle spasm and impair physical abilities[5].

Neurodevelopment shows that the muscles in the body are classified as tonic and phasic groups.[6], to maintain optimal posture and to perform proper gait pattern these two muscle groups helps[7].The tendency of tonic muscles towards tightness and contracture forming is more while the phasic muscle shows lengthening of muscles and weakening of muscles[8] psoas major, Gluteus maximus, Hamstring all these muscles causes posterior tilt of pelvis and increased lumbar lordosis. Skeletal muscles have their own resting length and they contract greatly[9] length of muscles is measured by range of motion which can one of the restricting and limiting factor[10].

To normalize the imbalance in between the muscle different approaches are used and this normalization takes place at tissue level. The tightened muscle which are the tonic musculature are consider to be contracted with decreased in sarcomere length along with sarcomere numbers beside these there is increase in amount of collagen, perimysium and connective tissue[11]. Force transmissions through passive stretch occur in lateral and longitudinal direction. Initial phase of lengthening via stretching increases tension, on further stretching it causes mechanical disruption of cross bridges leading to sudden sarcomere lengthening. Simple stretching method includes different stretches among which passive stretches also included. With the help and aid of an assistant, machine, therapist weight or pulley system one can uses forces externally to stretch the desired body tissue directly[12]. An advance type of stretching technique used to treat tight muscles is muscle energy technique.[13] as compared to static type of stretching a passive technique is used in the form of muscle energy technique in which active participation of a patient implement[14]. In this approach post isometric contraction to the effected muscle involves through the influence of autogenic inhibition.[15].Muscle energy technique is used to decrease pain, muscle tightness and fascia, improve circulation locally, joint restrictions and weak muscles strengthening[16].

In this study both the treatments are equally effective in the treatment of Lower Cross Syndrome. But if we consider the clinical significance then the Muscle Energy Technique showed a little more improvement as compared to the stretching group.

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MATERIALS AND METHODS

Study design and Participants: A Randomized Control Trail (NCT-04668040) was conducted in Bibi Zahida Memorial Teaching Hospital, NCS Peshawar, Pakistan. Ethical permission was taken from the Research Ethical Committee (Riphah/RCRS/REC/Letter-00383). Written and informed consent was taken from the subjects before the data collection. The sample size of 58 patients was calculated through open epi tool.
Randomization: Non probability convenience sampling with randomization via lottery method was used. Inclusion criteria included the presence of LCS pattern in standing position, patients having chronic low back pain, age from 20-50 years, both male and females and positive prone hip extension movement pattern test. Exclusion criteria for the patients were fracture, inflammatory disorder, acute disk bulge, lumber instability, idiopathic scoliosis, patients with RA and other systemic diseases (Fig. 1). Group A (Stretching Group), received Moist heating pad prior treatment for 10 minutes in order to prepare the muscle for treatment. The duration of the stretch and rest interval was 15 and 5 seconds respectively with 1 set of 5 repetitions and 3 sessions per week.

Group B (MET Group), received Moist heating pad prior treatment for 10 minutes in order to prepare the muscle for treatment. The duration of muscle energy technique contraction with 25% of MVC was 10 seconds along with 5 seconds of rest interval followed by 30 second of stretch. The number of rep was 5 of 1 set with a frequency of 3 sessions per week[17].

Outcome Measurements: For Pain measure The NPRS was used to assess each patient's pain severity. Muscle length of the iliopsoas, hamstrings rectus femoris and erector spinae was taken through goniometer and inclinometer respectively[18]. For Functional Measures the Oswestry disability question was used to find the disability index

Statistical analysis: Normality test applied and P values were noted by applying Shapiro-Wilk test for Stretching and MET group on the following variable i.e. Pre & post Bilateral iliopsoas, Hamstring & Rectus femoris as well as for pre & post erector spinae, NPRS, BMI and ODI. The data was analyzed through SPSS version 22. Descriptive statistics was used in terms of frequency for gender, age and BMI. For comparison of variables like NPRS, ODI and ROM Independent t-test was used between group A and group B and paired t- test was used within the groups

RESULTS

The Group A included 12, 10 and 7 participants in between age group of 21-30, 31-40 & 41-50 respectively. The selected participants in Group B were 10 in subgroup of age between 21-30 and 31-40 while there were only 9 participants in between the age of 41-50 years. The BMI mean value for Group A was 26.51 with standard deviation of 1.21 while Group B showed a mean of 27.57 with standard deviation of 1.54 (Table 1).

Table 1: Demographics of the participants

Variables		Stretch group	MET group
Gender	Male	9	12
	Female	20	17
Age	21-30	12	10
	31-40	10	10
	41-50	7	9
BMI (mean±SD)		27.57±1.54	26.51±1.21

Table 2: Comparison within the Group A(Stretching) and Group B (METS)

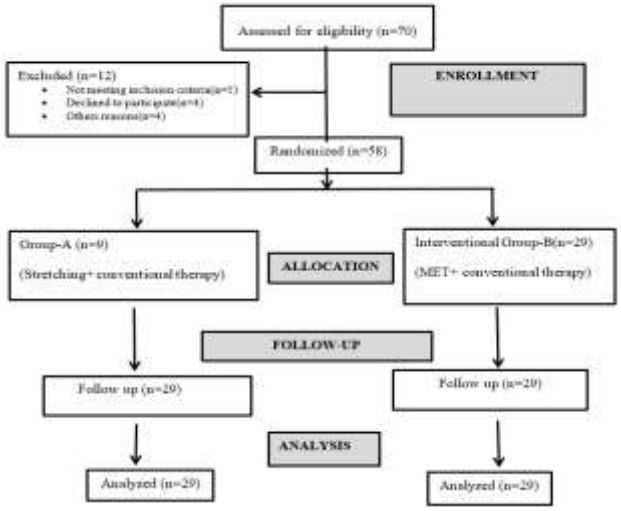
Variables	Groups		Means	Std. Deviation	P-Value
NPRS	Stretching	Pre	6.65	1.34	<0.05
		Post	2.65	1.28	
	METS	Pre	6.89	1.39	<0.05
		Post	2.34	1.69	
Rt.Iliopsoas ROM	Stretching	Pre	9.10	3.27	<0.05
		Post	4.62	2.52	
	METS	Pre	9.58	2.77	<0.05
		Post	3.79	2.73	
Lt. Iliopsoas ROM	Stretching	Pre	8.79	3.02	<0.05
		Post	4.44	1.99	
	METS	Pre	8.93	2.68	<0.05
		Post	3.58	2.41	
Rt. Hamstring ROM	Stretching	Pre	118.58	10.01	<0.05
		Post	132.75	11.41	
	METS	Pre	115.82	10.44	<0.05
		Post	137.34	10.97	
Lt. Hamstring ROM	Stretching	Pre	118.62	9.90	<0.05
		Post	131.34	11.22	
	METS	Pre	117.10	10.26	<0.05
		Post	135.34	11.24	
Rt.Rectus Femoris ROM	Stretching	Pre	50.68	9.62	<0.05
		Post	58.55	10.96	
	METS	Pre	52.75	9.61	<0.05
		Post	60.62	10.96	
Lt.Rectus Femoris **ROM**	Stretching	Pre	49.41	9.57	<0.05
		Post	57.75	10.91	
	METS	Pre	52.41	9.57	<0.05
		Post	60.75	10.91	
Erector Spinae ROM	Stretching	Pre	29.51	3.00	<0.05
		Post	38.89	3.24	
	METS	Pre	28.44	3.47	<0.05
		Post	39.37	3.13	
ODI	Stretching	Pre	42.96	13.52	<0.05
		Post	17.06	12.93	
	METS	Pre	44.27	10.29	<0.05
		Post	11.03	7.97	

NPRS: Numerical Pain Rating Scale ROM: Range of Motion, ODI: Oswestry Disability Index (ODI) ,***P≤0.001, significant difference.

Table 3: Comparison in between the Stretching and MET Groups

Variables		Groups	Means	Std. Deviation	P-Value
NPRS	Pre	Stretching	6.65	1.34	>0.05
		METS	6.89	1.39	
	Post	Stretching	2.65	1.28	>0.05
		METS	2.34	1.69	
Rt. Iliopsoas ROM	Pre	Stretching	9.10	3.27	>0.05
		METS	9.58	2.77	
	Post	Stretching	4.62	2.52	>0.05
		METS	3.79	2.73	
Lt. Iliopsoas ROM	Pre	Stretching	8.79	3.02	>0.05
		METS	8.93	2.68	
	Post	Stretching	4.44	1.99	>0.05
		METS	3.58	2.41	
Rt. Hamstring ROM	Pre	Stretchin	118.58	10.01	>0.05
		METS	115.82	10.44	
	Post	Stretching	132.75	11.41	>0.05
		METS	137.34	10.97	
Lt. Hamstrings ROM	Pre	Stretching	118.62	9.90	>0.05
		METS	117.10	10.26	
	Post	Stretching	131.34	11.22	>0.05
		METS	135.34	11.24	
Rt. Rectus Femoris ROM	Pre	Stretching	50.68	9.62	>0.05
		METS	52.75	9.61	
	Post	Stretching	58.55	10.96	>0.05
		METS	60.62	10.96	
Lt. Rectus Femoris ROM	Pre	Stretching	49.41	9.57	>0.05
		METS	52.41	9.57	
	Post	Stretching	57.75	10.91	>0.05
		METS	60.75	10.91	
Erector Spinae ROM	Pre	Stretching	29.51	3.00	>0.05
		METS	28.44	3.47	
	Post	Stretching	38.89	3.24	>0.05
		METS	39.37	3.13	
ODI	Pre	Stretching	42.96	13.52	>0.05
		METS	44.27	10.29	
	Post	Stretching	15.75	10.7	>0.05
		METS	11.03	7.97	

Fig. 1: CONSORT Diagram (Flow of participants through the trail)



Pre and post measures of Group A as well as the Group B was statistically analyzed with Paired T-test which showed significant difference between pre and post values (Table 2).

Independent t- test is applied on pre and post variables which were obtained at initial 1st and 4th week assessment of the patients. The analyzed variables of pre-treatment groups showed non significance in between Group A and Group B. One the other hand the post treatments group showed a decrease in the mean of NPRS of Group A as well as Group B i.e. 2.65 and 2.34 respectively. Mean of post Right ilipsoas for Group A was 4.62±2.52 and Group B was 3.79±2.73, with a p value >0.05. The mean post Lt iliopsoas of Group A and Group B

was 4.44±1.99 and 3.58±2.41 respectively and p value was >0.05. Mean of 132.75±11.41 was recorded for post Rt hamstrings for Group A and 137.34±10.97 for Group B, the P value is >0.05. The mean of post Lt hamstring for Group B and Group A was 135.34±11.24 and 131.34±11.22 respectively and no significant difference was found. Post Rt rectus femoris was observed with mean of 58.55±10.96 and 60.62±10.96 for Group A and Group B respectively with a P-value of > 0.05. Post Lt rectus femoris degrees mean for Group B was 60.75±10.91 and Group A was.75±10.91, with p>0.05. The mean of post erector spinae was 38.89±3.2 and 39.37±3.13 for Group A and Group B respectively with p value of >0.05. Post ODI for Group B was recorded as 11.03±7.97 while for Group A is 15.75±10.7 with a P-value of >0.05, which is a non-significant value significant value (Table 3).

DISCUSSION

The purpose of study was to analyze the effects of stretching exercises and muscle energy technique (MET) in patients of lower cross syndrome. The main aim was to compare the results of both techniques on treatment outcomes, Pain Intensity, Range of motion (ROM) and Disability. Result shows that both techniques were equally effective in increasing ROM, decreasing pain and disability but clinically MET shows better results as compared to stretching exercises.

Findings of this study about MET was effective in decreasing pain is supported by Fariz A et al. that muscle energy technique was effective in decreasing pain in patients with mechanical back pain.[19] This was supported by Yeong-Taek Oh that MET is clinically effective for treatment of chronic low back pain in reducing pain and improving range of motion[20].

According to findings of current study the p value showed no significant difference between stretching and MET. It was reported that both were effective in improving length of iliopsoas, hamstring, rectus femoris, and erector spinae muscle. This was supported by Jun-yong Lee et al. that MET was effective in improving the flexibility of shortened hamstring muscle directly after intervention and after 24 hours.[21] Results of this study was supported by Deshmukh MK et al. that post isometric relaxation and stretching exercises were effective in terms of improving ROM, pain and disability. It was concluded that MET gives long lasting effects on immediate pain reduction, tightness of piriformis muscle and disability in chronic Low Back Pain. [22] Nambi G et al. reported that Post Isometric Relaxation is effective in decreasing pain, improving hip joint range of motion & functional disability in patients with piriformis syndrome[23].Tawrej P et al. reported that in nonspecific low back pain the muscle energy technique of quadratus lumborum muscle showed significant results in improving lumbar spine flexion, side flexion and rotation ROM. [24] Trivedi K and Amarnath D reported that MET of erector spinae muscle is more effective in term of reducing pain and disability. But contrary to current study they concluded that MET has no significant effects in improving Lumbar spine ROM. They suggested that conservative therapy along with MET gives better results in increasing lumbar ROM.[25] In a study by Enas Elsayed et al, apply MET on the Imbalanced muscle especially the iliopsoas, rectus femoris, hamstring and erector spinae and found MET group was significantly better than the control group in pelvic angle, pain severity, and functional disability as p-value were less than 0.05[26].

CONCLUSION

The study concluded that both the treatments are equally effective in the treatment of LCS because there is no statistical significant difference in Stretching treatment and MET treatment. But if we consider the clinical significance then the MET treatment group showed a little more improvement as compared to the stretching group.

Conflict of interest: The authors declare no potential conflict of interest for this study.

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